

Peat Fires: the dangers from a Fire Manager's point of view

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Abstract

Based on the experiences of the personnel of the Fire and Emergency Services Authority who have attended number of peat fires on the Swan Coastal Plain in recent years, it has become evident that firefighters have to confront specific dangers and logistic difficulties associated with managing such fires in regard to access, environmental considerations, and the possibility of injuries. Generally, each fire has presented significant issues associated with fire suppression, recall to the fire, environmental consequences and the potential poor air quality that affects local communities. Once alight peat fires can take much longer to suppress than normal surface fires, and they are very complex events that require careful planning and management, as well as coordination across various agencies including local government.

Keywords: peat fires, safety, health, access, fire management

Introduction

Over the past decade, lake systems and surrounding low lying areas in and around Perth and the Swan Coastal Plain, generally, have exhibited extended periods of decreased water levels, and as the water levels have dropped, peat has been exposed and the possibility of fires involving peat has increased. While some fires have been triggered by lightning, there also has been an increase in peat fires due to increased arson and the subsequent lighting of stolen cars in wetlands (Fig. 1). Firefighters are now having to more and more face the complexity of how to deal with peat fires, a situation further complicated when these fires are in close proximity to residential areas, and fire managers must now develop best practice management strategies on how to deal with such fires.

This paper briefly summarises the general issues associated with peat fires from a management perspective; these range from the extended period that peat may burn, to issues of access, safety and health, the extinguishing of peat fires, and the possibility that such fires may become the source of secondary bush fires long after the original ignition of peat. The paper also describes some aspects of specific bush fires (such as the one at Neerabup, or the fire at Lake Carabooda).

This paper draws on my personal experiences of fire management on the Swan Coastal Plain and presents some opinions and discusses imperatives for fire management in peat soils

Issues for managing fires in peat

There are seven issues in managing peat fires; these are: (1) peat burning for extended periods; (2) access to the fire; (3) methods of extinguishing the fires; (4) safety

for the firefighters; (5) community health and safety; (6) the burning of peat being the source of a second fire; and (7) incident management and reporting for circumstances where peat is ignited.

Peat burning for extended periods

Once alight, peat can burn for extended periods well beyond the passage of the fire front, and peat fires are frequently more difficult to extinguish than those deriving from standard surface fuels. In some areas around the world, where the peat is deep and extensive, it has taken years to be sure that a peat fire is extinguished. However, if such fires are not extinguished there is a risk that the smoldering substrate will be the catalyst for an escape into un-burnt areas. Regardless of whether a decision is made to either extinguish or isolate the peat fire area, it will be necessary for firefighters to access the area, and be appropriately prepared for peat fire management.



Figure 1. A dumped vehicle set alight by arsonists.



Figure 2. Aerial view of the Neerabup fire.



Figure 3. Equipment bogged in the peat.



Figure 4. Dinosaur tanker.

Access for equipment and personnel

Access to the peat is one of the main problems that frontline firefighters face, both from the point of view of subterranean fire in peat, and the boggy nature of wet/moist peat. As peat fires can burn both on the surface and in subterranean, the area alight is not clearly visible. The thin dried surface can easily break with limited pressure, and there are extremely hot areas underneath the surface that are not easily apparent from anywhere other than in wetlands themselves (Santa Barbara County 2000). Thus, while the terrain may appear capable of

supporting the weight of equipment, this is not always the case. An example is provided by the extensive bush fire in February 2001 in Neerabup, north of Perth on the Swan Coastal Plain: this fire spread across an area of around 1500 ha (Fig. 2). The area around Lake Neerabup was severely affected, and as a result, a significant area of peat ignited and burnt for a number of months. Further, where there was wet/moist peat, during the fire, it was recorded that in one area alone up to four fire appliances and two earth moving machines broke through the dry surface of the peat and became bogged in the underlying wet peat (Fig. 3). Fortunately, these areas were not on fire at the time, but if left too long the equipment could have been exposed to the creeping subterranean fire.

One cannot overstate the adverse consequences of having equipment disabled during a bush fire emergency – not only are these resources needed to combat the incident, but they are also potentially in a situation where they could sustain damage. Additionally, personnel could find themselves in a position of suffering injury while retreating from their disabled appliances or while trying to recover them.

Ultimately, of course, in the situations described above, equipment will have to be recovered, and this has implications for the Incident Manager, who has limited resources and may have a very complex bush fire to manage. Firstly, additional resources will have to be found to assist with the recovery operation possibly further depleting the available firefighting equipment resource base, and secondly, personnel will have to be assigned to assist with the recovery operation. The Incident Manager needs to keep the safety of the personnel in the forefront of their mind, whilst continuing to manage a complex bush fire.

Traditional extinguishment methods

As noted above, peat fires are particularly difficult to extinguish. The traditional strategy for extinguishing the peat fire is by saturating the area using large tankers (Fig. 4). Where this cannot be achieved, an alternative has been to isolate the peat area by the installation of a mineral earth fire break commonly installed by using earth moving machinery such as front end loaders. This method would limit the extension of the fire but would not extinguish it, therefore, it should be expected that there will be some smoke in the area from the burning peat, until the peat either burns itself out, or winter rains flood the area and extinguish it.

In a particular case example at a fire in the vicinity of Lake Jandabup in February 2004, the Incident Manager concluded that the isolation of the peat was the only alternative available to prevent a further extension of the fire, since the resources required to saturate the area were not available. Once the peat was isolated, the area was monitored over a period of 6 days, during which time pockets of peat was still burning in close proximity to fire breaks (Fig. 5); these were extinguished using copious amounts of water from the patrolling fire appliances. From an environmental point of view, if the peat fire is not extinguished then there has to be realized that the burning peat will cause smoke pollution for some time well after the initial fire.



Figure 5. Fire burning through peat.

Safety of fire-fighting personnel and the public

Peat fires pose particular safety issues for firefighters. For instance, personal protective equipment at fire scenes is important for personnel, particularly whilst fighting subterranean bush fires. Protective coat, boots and helmet should be mandatory, however, in regard to smoke, or burning subterranean fuel, or hot ashes, eye protection and gloves are equally essential. For instance, in the case of the Brookton/Pingelly bush fire, a firefighter lost all of his fingers on one hand and several from the other as a result of falling into hot ashes.

Areas of demarcation need to be established to restrict access to fire-affected areas, particularly where peat has ignited. This restriction may also have to apply land owners and their families, until the Incident Manager can be sure that there is no risk of people or animals breaking the surface into the subterranean fire. This restriction may have to be in place for days, weeks or even months.

The level of smoke and airborne contaminants that firefighters and neighbours may be exposed to during the firefighting operation also needs to be evaluated. Smoke contains particulate matter, which can irritate the eyes, nose, throat and lungs, and can lodge in the lungs and cause health problems. Smoke can cause particular difficulties for people with existing respiratory or heart problems (see Hinwood & Rodriguez 2005, this issue). While one would expect that firefighters do not have predisposed respiratory conditions, a precondition for FESA recruitment (Fire & Emergency Services Authority 2005), consideration must be given to these smoke pollutants with respect to the wider community.

Global and local health issues

Global

During the 1997–98 forest and land fires in Indonesia and Malaysia, an area of approximately 10 million ha of land was burnt, and although only 15% of this land was in peat areas, the peat fires contributed an estimated 60% of the smoke and haze (Peat-Portal 2002). The ninth ASEAN Ministerial Meeting on Haze in June 2002, for instance, discussed the issues of fire prevention and

control in peatlands (Kamal *et al.*, 2003). These meetings were held as a result of the significant haze that affected the southeast Asian region, primarily as consequence of peatland and other vegetation burning. While the Swan Coastal Plains will not have the degree of problems that were experienced during the 1997–1998 fires in Southeast Asia it is still worth considering: (1) how long will the peat burn; (2) the environmental impacts of the fire; (3) the health effects to the public and nearby residents; and (4) the cost and consequences of leaving the fire burn. Thus, the Incident Manager must consider the ultimate social and environmental cost factors, which can vary from lost productivity of the fire and emergency services and on going response calls, to the relocation of residents.

Local

A fire near Lake Carabooda north of Perth provides an example where there was need to relocate residents because of smoke problems. Peat had been burning for a significant time, and eventually feeling that the nearby family's health may be affected, a resident requested atmospheric monitoring be undertaken by the Western Australian Department of Environment Protection Response Unit (WAEPRU). Subsequent monitoring confirmed that the concentrations of contaminants were close to the upper limit of the acceptable levels (pers comm., Peter May of WAEPRU, 26/08/2000). The Local Government was concerned about the health effects to residents and carefully considered a range of options, including the relocating the residents to temporary accommodation.

Conclusions

Fire managers must consider the safety of firefighting personnel, the safety of the local community, and the environmental consequences of their actions when accessing peat fire areas. They also need to be mindful that appliances and equipment can easily break the surface of peat, resulting in the bogging of equipment. The level of access that the public has to fire-grounds must be critically assessed, particularly where peat is involved. This includes the time period after the surface fire has passed, which may be days, weeks or months. If peat is left to burn or smoulder, respective government agencies will have to evaluate the possibility of health and welfare risks posed to the public in the vicinity of smoke and fumes. However, in the overall perspective, prevention of fire is preferable to the need to respond firefighting resources – even the best equipped fire service in the world will need the next significant rains to extinguish extensive peat fires. All fire, land management, government agencies and other interest organisations in Western Australia need to co-operate to develop policies, strategies and tactics that personnel in the front line can use to effectively and efficiently deal with peat fires while concurrently protecting the ecosystems and environment. In the interest of prevention, government agencies, land managers and other interested organizations need to develop strategies that will see the reversal of reduced water levels in wetlands and define pre-planned response mechanisms and capabilities including restraints that have to be considered or followed.

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